

THERE IS CLAIMED:

1. A selective frequency extractor for forwarding one or more selected frequencies of a wavelength division multiplex input signal consisting of N channels to one output port and all other frequencies to another output port, which extractor includes:
  - a demultiplexer having at least one input port and at least N output ports: for any value of i from 1 to N, the  $i^{\text{th}}$  output port of said demultiplexer is adapted to receive the corresponding  $i^{\text{th}}$  frequency of said input signal,
  - a multiplexer having at least N+1 input ports and at least two output ports: for any value of i from 1 to N, the  $i^{\text{th}}$  input port of said multiplexer is adapted to forward the  $i^{\text{th}}$  frequency of said input signal to a first output port of said multiplexer, and for any value of i from 2 to N+1, the  $i^{\text{th}}$  input port of said multiplexer is adapted to forward the  $(i-1)^{\text{th}}$  frequency of said input signal to a second output port of said multiplexer, and
  - optical switches for selectively connecting any  $i^{\text{th}}$  output port of said demultiplexer, for i from 1 to N, either to said  $i^{\text{th}}$  input port of said multiplexer or to said  $(i+1)^{\text{th}}$  input port of said multiplexer.
2. A reconfigurable frequency add and drop multiplexer, including:
  - a demultiplexer having at least two input ports for receiving two wavelength division multiplexes consisting of N channels, and at least N+2 output ports: for all values of i from 1 to N, the  $i^{\text{th}}$  output port of said demultiplexer is adapted to receive the corresponding  $i^{\text{th}}$  frequency of a first multiplex received at said first input port, and for any value of i from 3 to N+2, said  $i^{\text{th}}$  output port of said demultiplexer is adapted to receive the  $(i-2)^{\text{th}}$  frequency of the second multiplex received at said second input port,
  - a multiplexer having at least N+1 input ports and at least two output ports: for any value of i from 1 to N, the  $i^{\text{th}}$  input port of said multiplexer is adapted to forward the  $i^{\text{th}}$  frequency to a first output port of said multiplexer, and for any value of i from 2 to N+1, an  $i^{\text{th}}$  input port of said multiplexer is adapted to forward the  $(i-1)^{\text{th}}$  frequency to a second output port of said multiplexer, and
  - optical switches for selectively connecting any  $i^{\text{th}}$  output port of

said demultiplexer, for  $i$  from 3 to  $N$ , to the  $(i-1)^{\text{th}}$  input port of said multiplexer, or to the  $i^{\text{th}}$  input port of said multiplexer, or to the  $(i+1)^{\text{th}}$  input port of said multiplexer, the first and second output ports of said demultiplexer being each respectively connected to the first and second input ports and to the second and third input ports of said multiplexer, and the  $(N+1)^{\text{th}}$  and  $(N+2)^{\text{th}}$  output ports of said demultiplexer being each connected respectively to the  $N^{\text{th}}$  input ports and to the  $(N+1)^{\text{th}}$  input port of said multiplexer.

3. The device claimed in claim 1 or claim 2, wherein said demultiplexer and said multiplexer are both of the arrayed waveguide grating type.
4. The device claimed in claim 1, wherein said optical switches consist of two interleaved stages of optical switches.
5. The device claimed in claim 2 wherein said optical switches consist of three interleaved stages of optical switches.
6. The device claimed in claim 5 wherein said optical switches are optical amplifiers.